

# How To Use A Multimeter

## Made Simple

**The Beginners Guide on Using a Multimeter to Measure Voltage, Current, Resistance and Checking Continuity for Basic Home Electronics Maintenance**



**Dennis Ferry**

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## CHAPTER 1

## INTRODUCTION

In case you're doing any sort of electrical work—regardless of what the application is—perhaps the best device you can have available to you is a multimeter. In case you're simply beginning, here's the manner by which to utilize one and what each one of those befuddling images mean.

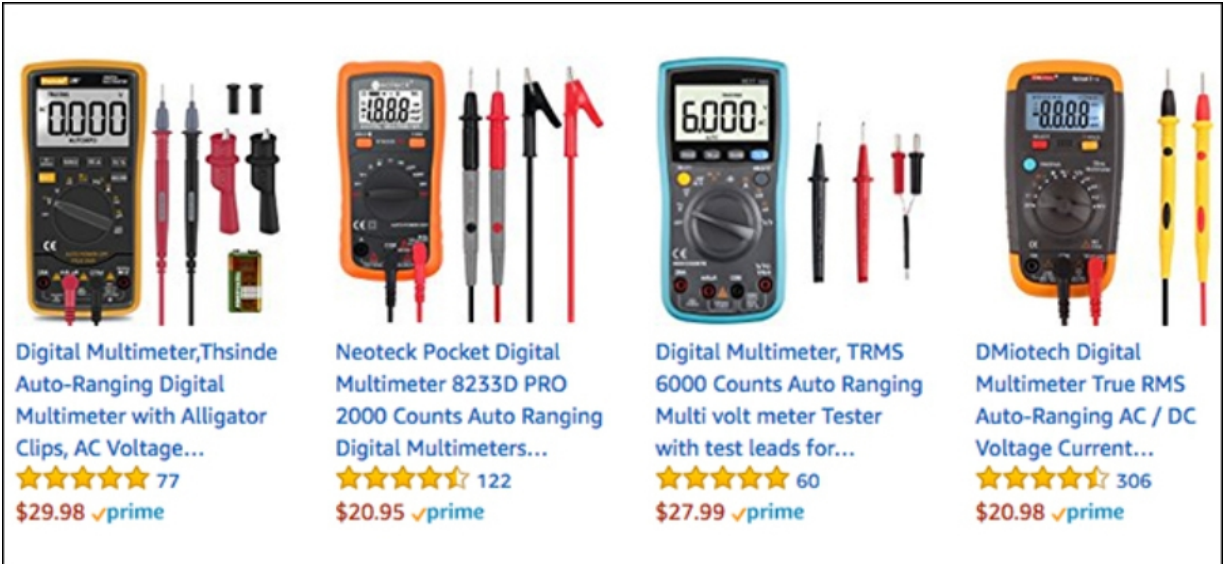


In this guide, I'll be alluding to my own multimeter and utilizing that as our model all through this guide. Yours strength be marginally extraordinary here and there, however all multimeters are comparable generally.

### Which Multimeter Should You Get?

There's truly not one single multimeter that you should go for, and it truly relies upon what highlights you need (or even highlights that you needn't bother with).





You can get something essential like this \$8 model, which accompanies all that you would require. Or on the other hand you can go through more money and get something fancier, similar to this one from AstroAI. It accompanies an auto-going component, which implies you don't need to choose a particular number worth and stress over it being excessively high or low. It can likewise quantify recurrence and even temperature .

## CHAPTER 2

### What Do All the Symbols Mean?



There's a great deal going on when you take a gander at the choice knob on a multimeter, however in case you're just going to do some essential stuff, you won't utilize half of the considerable number of settings. Regardless, here's an overview of what every image implies on my multimeter:

**Direct Current Voltage (DCV):** Sometimes it will be indicated with a V. This setting is utilized to quantify direct current (DC) voltage in things like batteries.

**Alternating Current Voltage (ACV):** Sometimes it will be meant with a V~. This setting is utilized to quantify the voltage from substituting current sources, which is basically whatever connects to an outlet, just as the power originating from the outlet itself.

**resistance ( $\Omega$ ):** This estimates how much obstruction there is in the circuit. The lower the number, the simpler it is for the current to course through, and the other way around .

**continuity:** Usually signified by a wave or diode image. This essentially tests whether a circuit is finished by sending an extremely modest quantity of current through the circuit and checking whether it makes it out the opposite end. On the off chance that not, at that point there's something along the circuit that is causing an issue—discover it!

Direct Current Amperage (DCA): Similar to DCV, yet as opposed to giving you a voltage perusing, it will reveal to you the amperage.

Direct Current Gain (hFE): This setting is to test transistors and their DC gain, yet it's for the most part futile, since most circuit repairmen and specialists will utilize the continuity check.

Your multimeter may likewise have a devoted setting for testing the amperage of AA, AAA, and 9V batteries. This setting is generally indicated with the battery image.

Once more, you presumably won't utilize half of the settings appeared, so don't get overpowered on the off chance that you just comprehend what a couple of them do .

## CHAPTER 3

### The most effective method to Use a Multimeter

First of all, gives up over a portion of the various pieces of a multimeter. At the essential level you have the gadget itself, alongside two tests, which are the dark and red links that have plugs toward one side and metal tips on the other.

The multimeter itself has a showcase at the top, which gives you your readout, and there's a major selection knob that you can turn around to choose a particular setting. Each setting may likewise have diverse number qualities, which are there to gauge various qualities of voltages, protections, and amps. So on the off chance that you have your multimeter set to 20 in the DCV area, the multimeter will quantify voltages up to 20 volts.



Your multimeter will likewise have a few ports for connecting the tests (presented previously):

The COM port means "Normal", and the dark test will consistently plug into this port.

The VΩmA port (now and then indicated as mAVΩ) is basically an abbreviation for voltage, obstruction, and current (in milliamps). This is the place the red test will plug into in case you're estimating voltage, obstruction, continuity, and current under 200mA.

The 10ADC port (now and then indicated as simply 10A) is utilized at whatever point you're estimating current that is more than 200mA. In case you don't know of the present draw, start with this port. Then again, you would not utilize this port at all in case you're estimating something besides current.

Cautioning: Make sure that in case you're estimating anything with a current higher than 200mA, you plug the red test into the 10A port, instead of the 200mA port. Else you could blow the circuit that is within the multimeter. Besides, estimating anything more than 10 amps could blow a circuit or pulverize the multimeter too.



Your multimeter may have totally separate ports for estimating amps, while the other port is explicitly only for voltage, resistance, and continuity, however most less expensive multimeters will share ports.

Anyway, we should begin really utilizing a multimeter. We'll be estimating the voltage of an AA battery, the present draw of a divider clock, and the continuity of a straightforward wire as certain guides to kick you off and acquainted with utilizing a multimeter.

## Testing Voltage

Start by turning on your multimeter, connecting the tests to their separate ports and afterward setting the selection knob to the most noteworthy number an incentive in the DCV area, which for my situation is 500 volts. In the event that you don't know at any rate the voltage scope of the thing you're estimating, it's consistently a smart thought to begin with the most elevated worth first and afterward work your way down until you get an exact perusing. You'll understand.



For this situation, we know the AA battery has an exceptionally low voltage, however we'll begin at 200 volts only for instance. Next, place the dark test on the negative finish of the battery and the red test on the positive

end. Investigate the perusing on the screen. Since we have the multimeter set to a high 200 volts, it shows "1.6" on the screen, which means 1.6 volts.



Be that as it may, I need an increasingly precise perusing, so I'll move the selection knob let down to 20 volts. Here, you can see that we have a progressively precise perusing that drifts somewhere in the range of 1.60 and 1.61 volts. Sufficient for me.



On the off chance that you were to ever set the choice knob to a number worth lower than the voltage of the thing you're trying, the multimeter would simply peruse "1", connoting that it's over-burden. So if I somehow

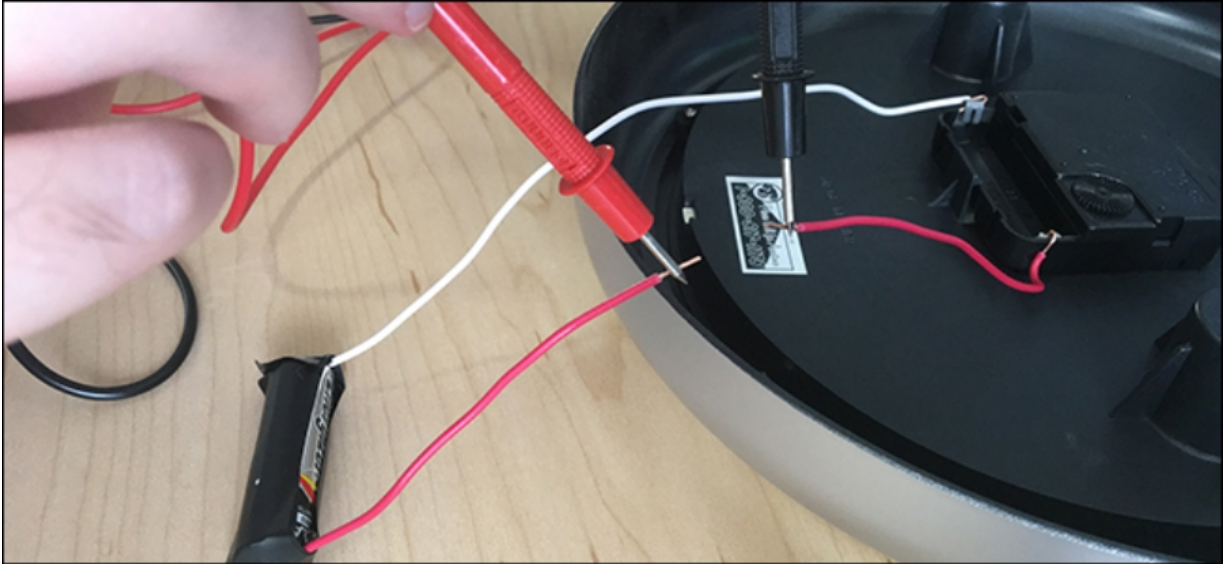
happened to set the knob to 200 millivolts (0.2 volts), the 1.6 volts of the AA battery is a lot for the multimeter to deal with at that setting.

Regardless, you may be inquiring as to why you would need to test the voltage of something in any case. All things considered, for this situation with the AA battery, we're verifying whether it has any juice left. At 1.6 volts, that is a completely stacked battery. Nonetheless, if it somehow managed to peruse 1.2 volts, it's near being unusable .

In a progressively pragmatic circumstance, you could do this sort of estimating on a vehicle battery to check whether it may be passing on or if the alternator (which is the thing that charges the battery) is turning sour. A perusing between 12.4-12.7 volts implies that the battery is fit as a fiddle. Anything lower and that is proof of a withering battery. Moreover, fire your vehicle up and fire up it a piece. In the event that the voltage doesn't increment to around 14 volts or thereabouts, at that point all things considered, the alternator is having issues .

### Testing Current (Amps)

Testing the present draw of something is somewhat trickier, as the multimeter should be associated in arrangement. This implies the circuit you're trying should be broken first, and afterward your multimeter is set in the middle of that crush to associate the circuit spirit up. Fundamentally, you need to intrude on the progression of current as it were—you can't simply stick the tests onto the circuit any place.



Above is an unrefined mockup of what this would resemble with an essential clock running off of an AA battery. On the positive side, the wire going from the battery to the clock is separated. We just spot our two tests in the middle of that break to finish the circuit once more (with the red test associated with the power source), just this time our multimeter will peruse out the amps that the clock is pulling, which for this situation is around 0.08 mA.

While most multimeters can likewise quantify exchanging current (AC), it's not so much a smart thought (particularly if its live power), since AC can be perilous in the event that you wind up committing an error. On the off chance that you have to see whether an outlet is working, utilize a non-contact analyzer.

## Testing Continuity

Presently, how about we test the continuity of a circuit. For our situation, we'll be rearranging things a considerable amount and will simply utilize a copper wire, yet you can imagine that there's a mind boggling circuit in the middle of the two closures, or that the wire is a sound link and you need to ensure it's working fine.

Set your multimeter to the progression setting utilizing the determination knob.





The readout on the screen will in a flash read "1", which implies that there isn't any continuity. This would be right since we haven't associated the tests to anything yet.



Next, make sure the circuit is unplugged and does not have any power. At that point interface one test to one finish of the wire and the other test to the opposite end—it doesn't make a difference which test goes on which end. In the event that there is a finished circuit, your multimeter will either signal, show a "0", or some different option from a "1". On the off chance that it despite everything shows a "1", at that point there's an issue and your circuit isn't finished.

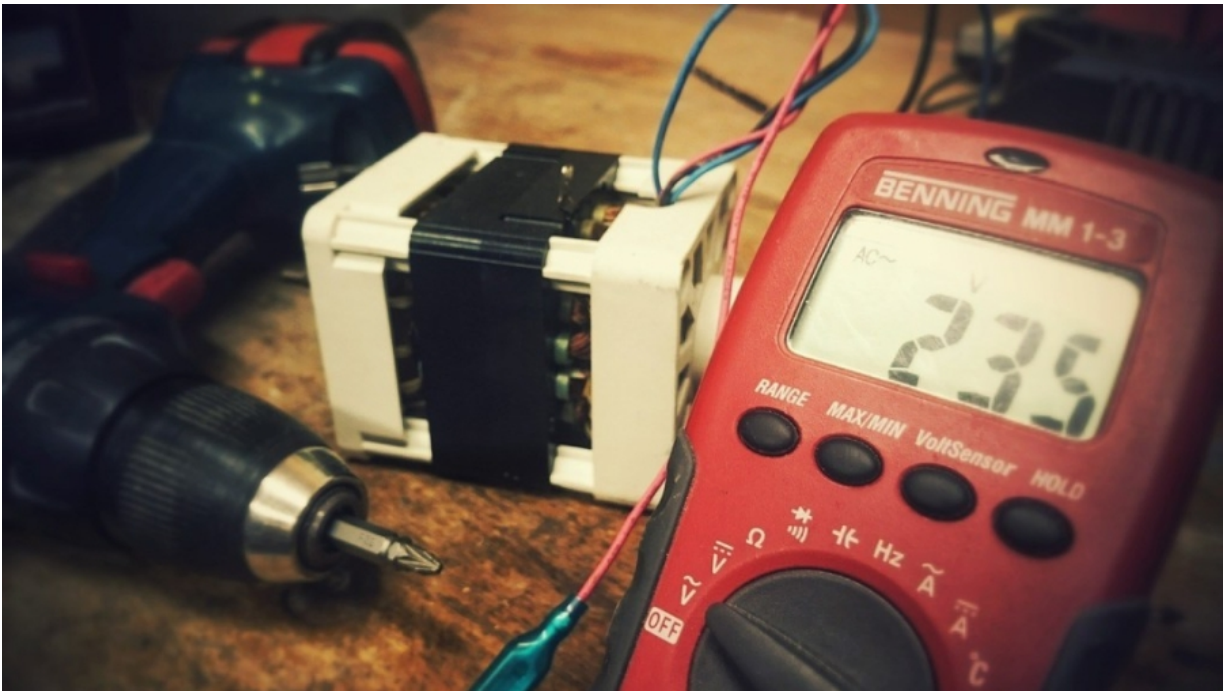


You can likewise test that the continuity include chips away at your multimeter by contacting the two tests to one another. This finishes the circuit and your multimeter should tell you that .

## CHAPTER 4

### The most effective method to Use a Multimeter – Beginner's Guide Method 2

In this post we're demonstrating how to utilize a multimeter. This post is for the most part tended to for apprentices who are beginning in hardware and have no clue about how to utilize a multimeter and how it very well may be valuable. We'll investigate the most well-known highlights on a multimeter and how to quantify current, voltage, obstruction and how to check coherence.



## CHAPTER 5

What is a multimeter and for what reason do you need one?

A multimeter is an estimation apparatus totally essential in hardware. It joins three basic highlights: a voltmeter, ohmmeter, and ammeter, and now and again continuity.





A multimeter permits you to comprehend what is happening in your circuits. At whatever point something in your circuit isn't working, the multimeter will help you investigating. Here's certain circumstances in gadgets extends that you'll discover the multimeter helpful :

is the switch on?

is this wire directing the power or is it broken?

what amount of current is coursing through this driven?

how much power do you have left on your batteries?



These and different inquiries can be replied with the assistance of a multimeter.

## Choosing a multimeter

You can locate a wide assortment of multimeters with various functionalities and exactness. A fundamental multimeter costs about \$5 and measures the three least difficult yet most significant qualities in your circuit: voltage, current, and obstruction.

Anyway you can figure that this multimeter won't last more and isn't extremely exact. The best multimeter for you will rely upon what you expect to do, in case you're a fledgling or an expert circuit repairman, and on your financial plan.

## Getting acquainted with a multimeter

A multimeter is created by four basic segments :

Display: this is the place the estimations are shown

selection knob: this chooses what you need to gauge

Ports: this is the place you plug in the tests



Probes: a multimeter accompanies two probes. For the most part one is red and the other is dark.



Note: There isn't any distinction between the red and the dark tests, only the shading.

Along these lines, expecting the show:

the dark test is constantly associated with the COM port.

the red test is associated with one of different ports relying upon what you need to gauge .

## Ports



The "COM" or "—" port is the place the dark test ought to be associated. The COM test is routinely dark.

10A is utilized when estimating enormous flows, more noteworthy than 200mA

$\mu$ A mA is utilized to quantify current

V $\omega$  permits you to quantify voltage and obstruction and test continuity

These ports can shift contingent upon the multimeter you're utilizing.

### Estimating Voltage



You can gauge DC voltage or AC voltage.

The V that has a straight line means DC voltage.

The V that has the wavy line means AC voltage.





### **To gauge voltage:**

Set the mode to V with a wavy line in case you're estimating AC voltage or to the V with a straight line in case you're estimating DC voltage.

Ensure the red test is associated with the port with a V close to it.

Interface the red test to the positive side of your part, which is where the current is coming from .

Associate the COM test to the opposite side of your part.

Peruse the incentive on the presentation.

Tip: to gauge voltage you need to interface your multimeter in corresponding with the part you need to quantify the voltage. Putting the multimeter in equal is setting each test along the leads of the segment you need to quantify the voltage.

Model: estimating a battery's voltage

In this model we're going to gauge the voltage of a 1.5V battery. You realize that you'll have roughly 1.5V. In this way, you should choose a range with the choice knob that can peruse the 1.5V. So you should choose 2V on account of this multimeter. In the event that you have an autorange multimeter, you don't need to stress over the range you have to choose.



Imagine a scenario in which you didn't have the foggiest idea what was the estimation of the voltage. On the off chance that you have to quantify the voltage of something, and you don't have the foggiest idea about the range wherein the worth will fall under, you have to attempt a few extents.

On the off chance that the range you've chosen is lower than the genuine worth, on the showcase you'll peruse 1 as appeared in the image underneath. The 1 implies that the voltage is higher than the range you've chosen.



In the event that you select a higher range, most piece of the occasions you'll have the option to peruse the estimation of the voltage, however with less exactness.



What occurs in the event that you switch the red and the dark test?



Nothing perilous will occur. The perusing on the multimeter has a similar worth, however it's negative.



Model: estimating voltage in a circuit

In this model we'll tell you the best way to gauge the voltage drop over a resistor in a basic circuit. This model circuit illuminates a LED.

TIP: two parts in equal offer voltage, so you ought to associate the multimeter tests in corresponding with the segment you need to quantify the voltage .

To wire the circuit you have to interface a LED to 9V battery through a 470 Ohm resistor.

To gauge the voltage drop over the resistor:

You simply need to put the red test in one lead of the resistor and the dark test on the other lead of the resistor.



The red test ought to be associated with the part that the current is originating from.

Likewise, remember to ensure the tests are connected the correct ports.

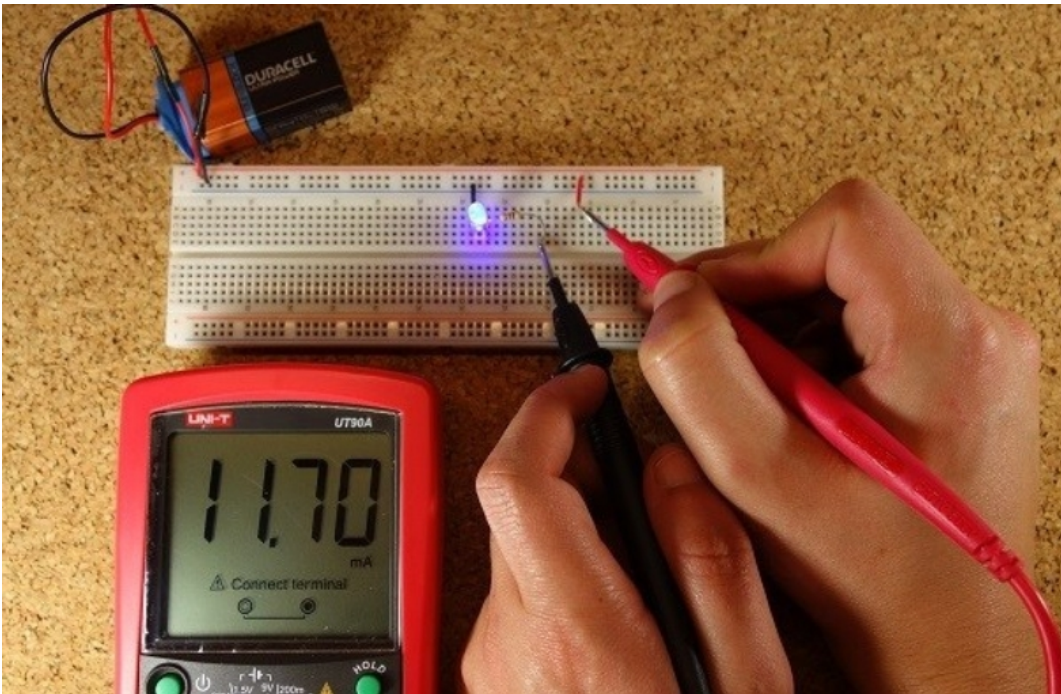


## Estimating Current

To gauge current you have to hold up under as a top priority that parts in arrangement share a current. In this way, you have to associate your multimeter in arrangement with your circuit.

TIP: to put the multimeter in arrangement, you have to put the red test on the lead of a part and the dark test on the following segment lead. The multimeter goes about as though it was a wire in your circuit. In the event that you separate the multimeter, your circuit won't work.

Prior to estimating the current, be certain that you've connected the red test in the correct port, for this situation  $\mu\text{mA}$ . In the model underneath, a similar circuit of the past model is utilized. The multimeter is a piece of the circuit.



## Estimating Resistance

Attach the red test into the correct port and turn the selection knob to the opposition segment. At that point, interface the tests to the resistor leads. The manner in which you interface the leads doesn't make a difference, the outcome is the equivalent.



As should be obvious, the 470 $\Omega$  resistor, just has 461 $\Omega$ .

## Checking Continuity

Most multimeters give an element that permits you to test the progression of your circuit. This permits you to effectively distinguish bugs, for example, defective wires. It likewise causes you check if two purposes of the circuit are associated.



To utilize this usefulness select the mode that resemble a speaker.

## How does continuity work ?

On the off chance that there is extremely low opposition between two focuses, which is not exactly a couple of ohms, the two focuses are electrically associated and you'll hear a ceaseless sound.





On the off chance that the sound isn't nonstop or on the off chance that you don't hear any solid whatsoever, it implies that what you're trying has a defective association or isn't associated in any way .

Cautioning: To test coherence you should kill the framework! Mood killer the power flexibly!

Contact the two tests together and, as they are associated, you'll hear a persistent sound.

To test the coherence of a wire, you simply need to interface each test to the wire tips.





## Wrapping u p

A multimeter is a basic instrument in any hardware lab. In this current Beginner's Guide, we've told you The best way To Use a Multimeter. You've figured out how to quantify voltage, current and opposition, and how to check continuity.

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